

Remarks

Entry of the foregoing and reconsideration of the application identified in caption as amended, pursuant to and consistent with the Rules of Practice in Patent Cases, and in light of the remarks which follow, is respectfully requested.

By the present amendment, claims 1 and 14 have been amended, so that claims 1-14, 16, and 17 will be pending upon entry of the present amendment. Applicants note that claim 15 was cancelled in a prior response.

Claims 1-17, stand rejected under 35 U.S.C. § 102(b) as being anticipated by WO 93/12759 to Mitra et al. This rejection is respectfully traversed.

Mitra et al. discloses dental adhesives containing water, acid-reactive filler, water-miscible acidic polymer, an ethylenically-unsaturated moiety, water-soluble reducing agent, water-soluble oxidizing agent, and optionally, photoinitiator. The Examiner refers to the abstract and page 8, where, among other suitable compounds, methylene bis-acrylamide is mentioned.

In order to distinguish the present claims over Mitra et al., applicants have amended the definition of B as follows:

B is a hydrocarbon radical with 2 to 50 carbon atoms which can contain one or more of the groups O, S, NH, CO-NH, and/or NH-CO-NH, and which is substituted n times with the group X,

This amendment finds support at least at page 5, last paragraph of the application as filed and excludes methylene bis-acrylamide, i.e., wherein B is a hydrocarbon radical with only one carbon atom. Accordingly, the present invention is not anticipated by Mitra et al.

Moreover, Mitra et al. do not teach or suggest combinations of the amide according to the presently claimed formula BX_n and at least one acidic polymerizable monomer.

Mitra et al. are concerned with a totally different type of dental material. The materials of Mitra et al. harden through two different mechanisms, an ionic reaction between acidic and inorganic filler components and a free radical crosslinking reaction involving an ethylenically-unsaturated component of the adhesive (page 5, lines 2 to 14). The adhesives are generally formulated in two parts, a first powder portion containing the acid-reactive filler and a second part containing acidic polymer and water (page 6, lines 18 to 24). Upon the combination of the two parts an ionic reaction occurs between acidic groups on the polymer and acid-reactive groups on the filler causing a hardening of the composition (page 7, line 33 to page 8, line 2). In addition, the compositions are hardened by radical polymerization.

In contrast, the materials of the present invention include a combination of an amide according to formula BX_n and an acidic polymerizable monomer. Curing of the material is achieved only by radical polymerization.

Mitra et al. in no way teach or suggest the use of acidic polymerizable monomers, let alone in combination with an amide according to formula BX_n . In addition, Mitra et al. do not teach or suggest the use of amides according to formula BX_n wherein B includes at least two carbon atoms. In fact, Mitra et al. do not even provide an incentive to use methylene bis-acrylamide. This compound is disclosed in a long list of possible monomers which may be used as ethylenically-unsaturated components. However, it is preferred that the ethylenically-unsaturated moieties are present as groups on the acidic polymer (page 8, lines 24 to 28).

Methylene bis-acrylamide is used for evaluating the amount of reducing agent and oxidizing agent needed to achieve crosslinking of the compositions (page 13, lines 8 to 12 in combination with page 18, Example 1, Table 1a and page 19, lines 1 to 4). The dental materials themselves do not include this component (page 20, Table IIb). Thus, it is not obvious from this document to use a combination of an amide according to formula BX_n and an acidic monomer to produce the dental materials of the present invention.

Furthermore, the present inventors demonstrated that the materials of the present invention are unexpectedly better adhesives than the materials disclosed by Mitra et al. In Example 7 of the present invention it is shown that the materials of the invention have a high hydrolysis stability; at 37°C the compositions were completely stable in the presence of 10% phosphoric acid for four weeks. Example 8 of the application shows that the compositions of the present invention when applied in a single layer with phosphoric acid pretreatment achieve a shearing adhesive strength of 15.4 MPa to bovine teeth dentine.

According to Table VII on page 26 of Mitra et al. a shearing strength to bovine teeth dentine within the range of 0.4 to 12.0 MPa was achieved with the application of two coats of Mitra et al. adhesives. The value of 12.0 MPa was obtained by the consecutive use of two adhesives, the first one of which involved three and the second one two curing reactions. Similarly, the shear adhesion values reported in Table XI at page 34 of Mira et al. were acquired using two coats of adhesive in which each required two step hardening. Moreover, as shown in Table IX on page 30 of Mitra et al., run no. 1 indicates that the use of a single coat of Mitra et al. adhesive gave a shearing adhesive strength to dentine of 1.9 MPa. The difference in the comparison of the adhesive strength of 15.4 MPa achieved by the present invention and the adhesive strength 1.9 MPa achieved by Mitra et al. for single coats cannot be explained by the lack of pretreatment of the Mitra et al. example, since run nos. 2

and 3 of Table IX indicate only a slight shear adhesion increase resulting from the phosphoric acid pretreatment of the Mitra et al. tooth as compared to no pretreatment.

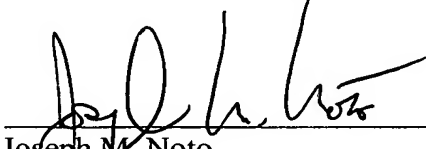
In contrast, a single application of the adhesives of the present invention which are hardened by a 40 second irradiation with light gives a shearing adhesive strength to dentine of 15.4 MPa. Thus, a single coat of the adhesives of the present invention result in a higher shearing adhesive strength to dentine than a single coat of the Mitra et al. adhesives.

A further advantage of the materials of the present invention is the fact that mixing of the components does not result in an immediate hardening by ionic reaction. Thus, when a photo initiator is used hardening can be started in a controlled manner and one-component materials are accessible. For at least the reasons noted above, the presently claimed invention is not obvious over the teachings of Mitra et al.

Accordingly, withdrawal of the record rejection over Mitra et al. and allowance of claims 1-14, 16, and 17 are respectfully requested. From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is hereby earnestly solicited.

Respectfully submitted,

Date: 11-18-04



Joseph M. Noto
Registration No. 32,163

NIXON PEABODY LLP
Clinton Square, P.O. Box 31051
Rochester, New York 14603-1051
Telephone: (585) 263-1601
Facsimile: (585) 263-1600

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

☒ deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450

☐ transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (703) _____.

Nov. 18, 2004

Date

Ruth R. Smith

Signature

Ruth R. Smith

Type or Print Name